Design Quality Criteria for Smartphone Applications Interface and its Impact on User Experience and Usability

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Abstract:

The ease of use of smartphone applications makes using them quite joyful because they are an essential part of our modern lifestyle and have a big impact on our day-to-day activities. A computer program or software application that is specifically made to run on a mobile device, such as a phone or tablet, is called a mobile application. User interface (UI) and User Experience (UX) design principles are used to create the program and evaluate its quality. This research discusses the new UI/UX design concepts for mobile applications to explain their characteristics and their effects on improving the quality of the User interface (UI) and User Experience (UX).

The purpose of this research is to explain the features of the new UI/UX design principles for mobile applications and their effects on enhancing the quality of the applications and users' satisfaction with these applications that are designed based on these new principles. Applying these new design Criteria into practice.

Design/methodology/approach: the researcher uses a descriptive method for collecting data and applying quantitative methodology through a questionnaire as a tool applied on a sample of three categories of mobile applications, (Bank app, Shopping app, Mobile network app) to exam the results of the research.

Findings: Quality design criteria of mobile apps can positively impact user experience. Prioritizing usability, visual design, performance, accessibility, and personalization can create a user-centered design that meets users' needs. Such apps are easy to use, visually appealing, fast, accessible, and personalized, leading to improved user satisfaction.

Originality/value these applications needs graphic analysis in terms of aesthetics and the compatibility of the interface with the design identity and its uses. This study is a serious contribution to develop the skills and experiences of designers in the graphic design field.

1. Introduction:

This era witnessed a revolution in all fields, the most important of which are: the communications revolution and the spread of smartphones, the use of these devices has become obligatory and not an option for a person, and with the presence of smartphones, there are applications for these phones, which have become an essential and important part of an individual's life, such as WhatsApp, Facebook, Snapchat, Instagram, and Twitter...etc. Human use of the phone has become a necessity of life, as the smartphone has enriched the need for watching TV, browsing the newspaper, or using traditional means of communication.

Smartphone applications have entered all different fields. In the medical field, there are applications Through it, the user can ask questions to doctors or specialists to get answers or take an appointment with his doctor through the application, As an example of these applications Vezeeta application (local app). In the field of linguistic education, the user can learn a new language in any country whose language he does not know, as long as the application is on his smart device. As for the commercial field, it has become possible to buy, sell, and advertise goods in all their forms, such as furniture, land, cars, clothes, and services, through smart applications such as the Amazon application. As for jobs and the search for work, the user can now search for a job or advertise jobs through LinkedIn application, as it allows creating a profile with experiences and educational level for easy viewing.

2. Literature Overview

2.1 Definition of the main concepts:

Smartphones is a "mobile phone that performs many of the functions of a computer, typically having a touchscreen interface, Internet access, and an operating system capable of running downloaded apps" (Oxford Living Dictionaries 2017). It is a personal device owned by one user. Such devices have become widely used: while there are many different brands and generations of smartphones (Whyte, 2019).It is a multipurpose physical device of internal complexity with processors, sensors, GPS, camera, microphone, speaker and display. (Brynjolfsson, 2014)

Mobile app (or mobile application)

The term "app", short for "application", has since

become very popular; in 2010, it was listed as "Word of the Year" by the American Dialect Society.

(Baktha K., 2017), define mobile application as" a software that are developed specifically for use on small wireless computing devices, such as smartphones, According to (Islam, R., Mazumder, T., Islam, R.:, 2010), mobile applications are a set of pro-grams that run on a mobile device and allow the execution of certain tasks for the user.

2.2 Types of mobile apps

According to application area, there are different categories of mobile application (Islam, R., Mazumder, T., Islam, R.:, 2010):

Mobile applications, also known as apps, can be classified into different categories based on their purpose and functionality. One such category is communication apps, which include internet browsing, email, instant messaging clients, and social networking apps. These apps allow users to stay connected with friends, family, and business associates from anywhere in the world.

Another popular category of mobile apps is games, which provide entertainment to users. Games can be further divided into subcategories such as puzzle/strategy games, cards/casino games, and action/adventure games. These games are designed to engage users and provide them with a challenging and fun experience.

Multimedia apps are another category of mobile apps that allow users to view and interact with different types of media. These apps may include graphics/image viewers, presentation viewers, video players, and audio players. Multimedia apps are useful for both personal and professional use, allowing users to view and share media with others.

Productivity apps are another popular category of mobile apps that help users manage their tasks and improve their productivity. These apps may include calendars, calculators, diaries, notepads/ memo/ word processors, and spreadsheets. They are designed to help users plan and organize their work, keep track of important dates and deadlines, and collaborate with others on various projects.

Mobile apps are sometimes categorized according to whether they are web-based or native apps, which are created specifically for a given platform. A third category, hybrid apps, combines elements of both native and web apps. Here's a detailed explanation of web-based, native and hybrid apps**:**

* Native app

Applications that are specifically designed and developed for a particular mobile operating system are referred to as native applications. The top three mobile operating systems are Windows Phone, Apple's iOS, and Google's Android. Common, key characteristics of native applications are that these applications have unhindered access to device hardware and support all user interface and interactions available in the respective mobile operating environment. (Jobe, 2013)

* Web-based app

Mobile web applications refer to web applications that are designed and developed to mimic the native applications of the host operating system as much as possible, but they execute in a web browser on the host platform. Dedicated mobile web applications are developed with a combination of HTML5, JavaScript, and CSS. (Jobe, 2013)

* Hybrid app

An application that is neither technically a native app nor a mobile web app is called a hybrid web app. It is an application using the web technologies HTML5, JavaScript APIs, and CSS but that is running inside a third-party native app container. The main distinguishing features of a hybrid app are that they are created using common web development languages while often having access to native hardware and APIs.

3. User experience (UX)

UX: Person's perceptions and responses resulting from the use and/or Expectations use of a product, system or service (ISO9241-210), Mobile user experience (UX) design refers to the design of positive experiences during the use of mobile devices and wearables, and applications or services running on such devices. It is the research field which identified users' needs, expectation and acceptance when there is an interaction with a product or service, (A., Yazid M. and Jantan, 2017).

The process of improving satisfaction by enhancing the usability and accessibility provided in the interaction between user and a product. User experience includes all the users 'emotions, beliefs, preferences, perceptions, physical and psychological responses, behaviors and accomplishments that occur before, during and after use. User experience is a consequence of brand image, presentation, functionality, system performance, interactive behavior and assistive capabilities of the interactive system the user's internal and physical state resulting from prior experiences, attitudes, skills and personality, and the context of use. Basically, the user experience refers to the feeling a person has while interacting with the product under particular conditions. There are several types of people, products and environments that influence the interaction (Arhippainen, 2006). According to Yong ([Yong, 2013) studying user experience is studying how users feel about a product, before, during and after an interaction. The user and the product interact in a particular context where social and cultural

factors must be taken into account. The user has the following psychological spheres: values, emotions, expectations and previous experiences. The mobile device also has factors that influence the experience, such as adaptability and mobility. All these factors influence the user - product interaction (Arhippainen, 2006) .Thus, a more rigorous research on the development of an evaluation of user experience is necessary to achieve an understanding of which product features evoke emotional responses from the user and whether this response is positive or negative ([Yong, 2013)

Chen (Chen, Z., Zhu, S.:, 2011) developed a four-dimensional user experience assessment system, which consists of analyzing the following aspects:

user, application, device and contextual parameters. In relation to the user, it refers to their expectations and humor, and how it affects the experience with the system. The application aspect refers to the visual properties, functionalities and interactive actions. Context is defined as the combination of the social environment the user is in, the device environment the user is in and the task he performs at that time. The model proposed by Chen (Chen, Z., Zhu, S.:, 2011) consists of a number of criteria and sub-criteria (shown in the image below) to evaluate the user experience, all of which can be calculated quantitatively. Follows a template image and their criteria:
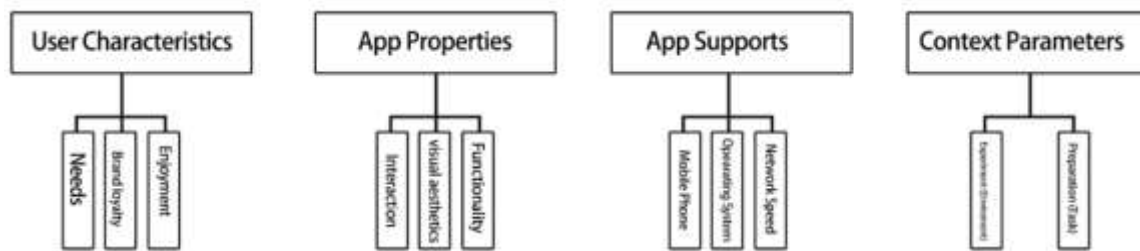

Figure 1 Evaluting criteria of user experience

3 A mobile app's primary need from a user is that it be quick and simple. During the design process, mobile app developers take feedback, personalization, accessibility, affordance, reversibility, minimalism, and ease of use into account. user objectives, Versatility, adaptability, customized navigation, animation, calming color combinations, and human writing split-screen, subtle gradients, disabled-friendly design, minimalism, speed, and voice interaction are the new principles of UX design trends of 2020. (Helmy, 2021)

When designing a mobile app, it's important to prioritize the user experience (UX) to create a high-quality product that users will enjoy and continue to use. One key aspect of a good UX is usability, which means designing the app with the user in mind and making it easy to use and intuitive. This involves taking into account the user's needs, preferences, and expectations, and designing the interface accordingly. Another important element of a quality UX is performance. Users expect a mobile app to be fast and responsive, and slow load times, glitches, or crashes can quickly lead to frustration and negative reviews. A well-designed app should be optimized for speed and reliability, ensuring a smooth and seamless user experience.

Ultimately, the UX designer must understand the user's goals and needs to create an app that meets their expectations. For example, if a user prefers that a mobile application open quickly, the designer should prioritize speed and minimize any unnecessary delays or loading screens. By focusing

on these key factors, a UX designer can create a mobile app that is both enjoyable and functional, leading to increased user engagement and satisfaction.

In today's world, users expect the applications they use to be highly versatile. They want to be able to access the same app from different devices, such as a tablet, a smartphone, or a computer. This means that UX designers need to consider how the app's operation may be affected by the size and capabilities of each device. Another important aspect of app design is personalization. Users come from different backgrounds, cultures, and situations, and their needs and preferences vary greatly. It is important for app designers to take into account the functional, cultural, and situational status of the user when designing an app. By doing so, the app can provide a more personalized experience, tailored to the user's unique needs and preferences. For example, an app that provides recommendations can greatly benefit from personalization. By analyzing the user's usage pattern and behavior, the app can provide flexible and individualized recommendations that are more likely to be useful and relevant to the user. This can enhance the user's experience and increase the app's value to the user. In summary, versatility and personalization are two key aspects of app design that must be taken into account by UX designers to create a successful and user-friendly app.-1 UX Designer Principles

3.2 Usability

Usability is a quality attribute that assesses how

easy user interfaces are to use (Norman & Nielsen) ,Mobile application usability is defined, drawing from the International Standards Organization's (ISO) definition of usability, as the degree to which a mobile application can be used by specified users to achieve specified goals with effectiveness, efficiency, and satisfaction in a specified context of use (Hoehle, H., Aljafari, R., and Venkatesh, V., 2016) ,Usability is a quality attribute that assesses how easy user interfaces are to use. The word." usability" also refers to methods for improving ease-of-use during the design process (Patel, 2014).

3.3 Usability components:

Mobile application usability is a critical factor in determining whether an app will be successful or not. There are several components that contribute to the overall usability of a mobile app. First and foremost, the app should be easy to use and navigate, with clear and concise menus, buttons, and icons. The app should also be visually appealing, with a clean and intuitive design that is consistent throughout. Another important component is the app's responsiveness, which refers to how quickly the app responds to user inputs and actions. The app should also provide clear feedback to the user, such as error messages or confirmation messages, to ensure that the user understands what is happening at all times. Finally, the app should be accessible to users with disabilities, with features such as screen readers and voice commands. By focusing on these usability components, developers can create mobile apps that are easy to use, engaging, and effective. Usability 5 quality components (Nielsen, 2010):

- **Learnability:** How easy is it for users to accomplish basic tasks the first time they encounter the design?
- **Efficiency:** Once users have learned the design, how quickly can they perform tasks?
- **Memorability:** When users return to the design after a period of not using it, how easily can they reestablish proficiency?
- **Errors:** How many errors do users make, how severe are these errors, and how easily can they recover from the errors?

Figure 2 showing recover from the errors

- **Satisfaction:** How pleasant is it to use the design?

There are many other important quality attributes. A key one is utility, which refers to the design's functionality: Does it do what users need?

Usability and utility are equally important and together determine whether something is useful: It matters little that something is easy if it's not what you want. It's also no good if the system can hypothetically do what you want, but you can't make it happen because the user interface is too difficult. To study a design's utility, you can use the same user research methods that improve usability.

- **Definition:** Utility = whether it provides the features you need.
- **Definition:** Usability = how easy & pleasant these features are to use.
- **Definition:** Useful = usability + utility.

3.2.2 Usability Requirement

Mobile application usability requirements are the criteria that must be met to ensure that a mobile app is usable and effective. These requirements can include factors such as ease of use, simplicity, responsiveness, accessibility, and user engagement. Usability requirements should be defined early in the app development process and should be based on user research and feedback. For example, usability testing can be used to identify areas where users may struggle to use the app, and to gather feedback on how to improve the app's usability. Usability requirements should also take into account the app's target audience, as different users may have different needs and preferences. Ultimately, meeting usability requirements is critical for the success of a mobile app, as users are more likely to abandon an app that is difficult to use or frustrating to navigate. By prioritizing usability requirements and incorporating them into

the app development process, developers can create mobile apps that are intuitive, engaging, and effective. Usability Requirement (Nidhi Patel, 2014): Effectiveness (Accuracy, Completeness), Efficiency (resources expended), Satisfaction (comfort and acceptability) (ISO-9241)

4. User Interface (UI)

All components of an interactive system (software or hardware) that provide information and controls for the user to accomplish specific tasks with the interactive system (ISO 9241-210). A mobile user interface (mobile UI) is the graphical and usually touch-sensitive display on a mobile device, that allows the user to interact with the device's apps, features, content and functions. Designing the user interface (UI) is a very important feature for developing the application for mobile devices. Designing UI for mobile applications is so difficult. Therefore, developing applications for mobile devices is challenging and rewarding in its outcome (M, Ghiduk A. and Elashiry, 2012)

4.1 User interface (UI) design principles:

The quality of a mobile application's user interface (UI) is essential to its success. there are some key concepts related to quality in mobile app UI (Helmy, 2021):

A high-quality user interface (UI) is an essential aspect of any successful application. It should be clear and easy to understand, communicating its purpose and functionality to the user in a straightforward manner. A consistent UI is also crucial, as it helps users understand how to use the app and what to expect. This consistency includes using the same fonts, colors, and icons throughout the app. A quality UI should also respond quickly and accurately to user input. Slow loading times or unresponsive buttons can frustrate users and lead to negative reviews. Therefore, a well-designed UI that is both clear and consistent, and that responds quickly and accurately to user input, is essential for providing a positive user experience and ensuring the success of an application

The goal of a UI is to provide a seamless and enjoyable experience for users. This can be achieved by making the UI intuitive and easy to use. Users should be able to navigate the app and understand its functionality without needing any instructions. A visually appealing UI can also enhance the user's experience. This includes using high-quality graphics and images, as well as a pleasing color scheme. A quality UI should also allow users to customize their experience, such as changing the font size or color scheme. All of these elements work together to create a UI that is both functional and enjoyable for users.

Color and typography are essential parts of the visual design of any mobile application. They can significantly influence the user's perception of your application and impact the overall user experience. Here are some color and typography principles to keep in mind when designing your mobile application:

4.2 Color Principles:

When it comes to color principles in designing an application, there are a few key considerations to keep in mind. First and foremost, consistency is crucial. By sticking to a consistent color scheme throughout the application, you can help to maintain a cohesive and visually pleasing brand identity that will help users to recognize and remember your product. Another important consideration is color contrast. You want to ensure that there is enough contrast between text and background colors to improve legibility and readability. This is particularly important for users with visual impairments or who may be viewing the application in challenging lighting conditions. Finally, it's important to consider color psychology. Different colors can have different emotional and psychological impacts on users, so it's important to select colors based on their suitability to the application's purpose, message, and user base.

4.3 Typography Principles:

Typography is a critical aspect of design that affects the readability and visual appeal of text in an application. To ensure legibility, designers should use appropriate font sizes, spacing, and contrast to enhance the readability of the text. Consistency is also essential in typography, as it helps to maintain a cohesive brand identity. Using a consistent font size, style, and color throughout the application can help to reinforce the brand's visual identity and ensure that the text is easy to read and understand. Hierarchy is another crucial aspect of typography that helps to create a clear visual structure and guide users' attention. Designers can use different font sizes, weights, and styles to create a hierarchy that helps users scan and prioritize content. For example, larger font sizes and bold weights can be used to draw attention to headings and important information, while smaller font sizes and lighter weights can be used for secondary information. Choosing the appropriate typeface is also important in typography. Designers should select a typeface that aligns with the application's purpose and brand identity. For example, a sans-serif typeface may be more appropriate for a modern and minimalistic application, while a serif typeface may be more suitable for a traditional and formal application. Overall, typography plays a critical role in design, and designers should consider legibility, consistency, hierarchy, and typeface when creating effective and visually appealing text.

4.4 Navigation design principles

Navigation is a critical aspect of mobile application design, as it directly impacts the user experience of your application. Here are some navigation design principles to keep in mind when designing your mobile application (Griffiths, April 2015):

- **Consistency:** Consistency in navigation elements, layout, and labeling ensures that users can navigate easily between different sections of the application without confusion.
- **Simplicity:** Keeping navigation simple, intuitive and easy-to-use is vital to ensure that users can easily find their way around your application.
- **Clarity:** Navigation should be clear, concise, and easy to understand. Avoid using technical jargon or non-standard labeling that might cause confusion.
- **Customization:** Provide options for users to customize their navigation experience, such as sorting or filtering options.
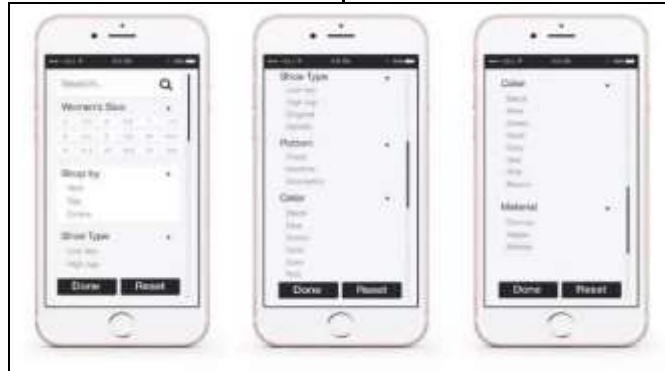

Figure 3 showing customiziton navigation

- **Feedback:** Include feedback mechanisms in your navigation design to let users know where they are in the application, what options are available to them, and how they can access desired features.
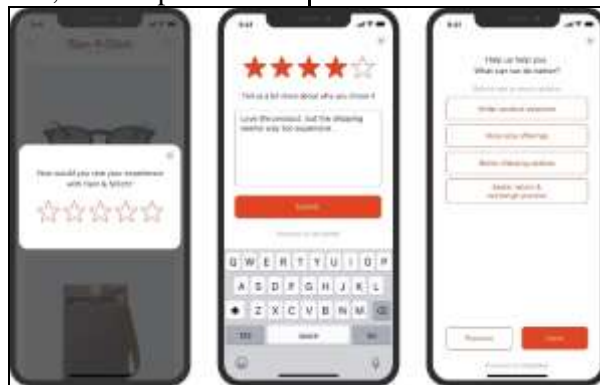

Figure 4 showing feedback mechanisms in navigation design

- **Visual Hierarchy:** Using visual hierarchy to help guide user attention to the most important navigation elements, making them easier to find and interact with.
- **Error prevention:** Include error prevention mechanisms, such as confirmation dialogs, tooltips, or messaging to help users understand the consequences of potential actions.
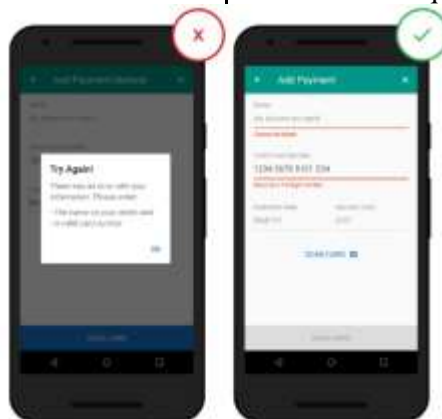

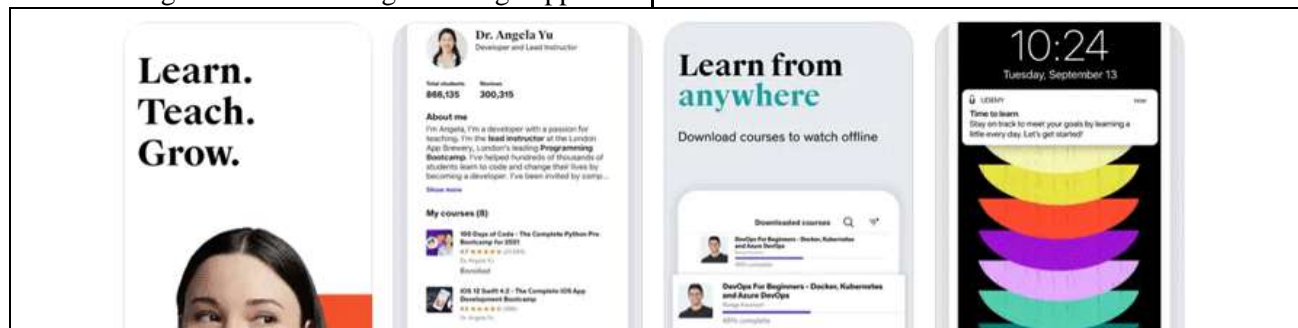Figure 5 showing error prevention mechanisms

5. Analytical study:

When it comes to designing apps, it's important to consider both User Interface (UI) and User Experience (UX) factors. UI refers to the visual elements and layout of an app, while UX refers to the overall experience the user has while interacting with the app. In this analytical study, we will analyze three design apps and evaluate their UI and UX. By doing so, we hope to gain a better understanding of what makes a good design app and what areas may need improvement. The three design apps we will analyze are: Udemy app, Talabat app and Amazon app. We will evaluate these apps based on their UI and UX design, ease of use, features, and overall functionality. By the end of this analysis, we should have a better understanding of what makes a great design app.

Udemy application:

Udemy is an online learning platform that offers a wide variety of courses on different subjects, from technology and business to arts and personal development. As a user-centered platform, Udemy's application design is focused on providing a seamless learning experience for its users. analyzing the design principles of the Udemy application in terms of its user interface, user experience, and usability.
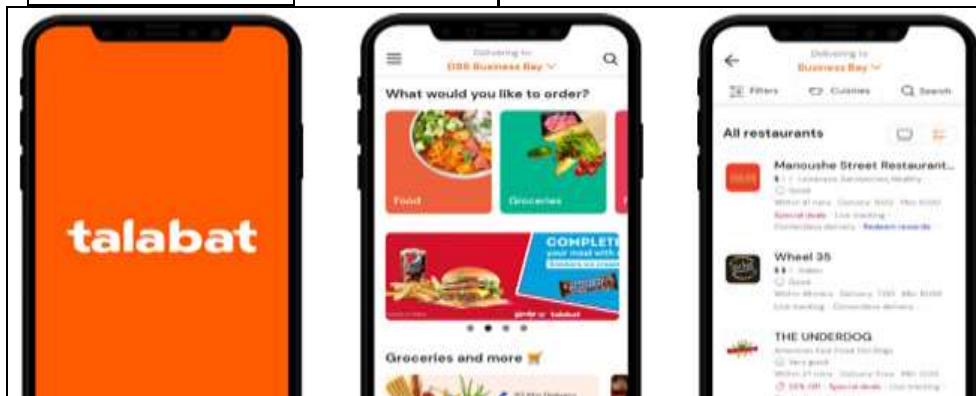
User Interface	The user interface of the Udemy application is clean, simple, and easy to navigate. The layout is intuitive, and the color scheme is consistent throughout the application. The use of large images and icons helps to make the content more visually appealing and engaging. The search bar is prominently displayed at the top of the screen, making it easy for users to find the courses they are looking for. Additionally, the course pages are designed with clear headings, descriptions, and reviews, making it easy for users to understand what they are signing up for.
User Experience	Udemy has a strong focus on user experience. The platform is designed to be accessible to users of all skill levels, with a straightforward sign-up process and easy-to-use features. The application provides personalized recommendations based on the user's interests and past course activity, which helps users discover new courses that are relevant to their needs. Additionally, the application offers a variety of course formats, including video lectures, quizzes, and assignments, which helps users engage with the content in different ways.
Usability	The Udemy application has a high level of usability, with a well-organized layout and clear navigation. The search functionality is robust, allowing users to filter courses by topic, level, language, and other criteria. Users can also easily track their progress through courses, with clear indicators showing which lectures they have completed and which are still outstanding. The application also provides users with the ability to review courses and instructors, helping to create a sense of community and accountability among users.
Support	Udemy offers a variety of customer support options to help users with any issues they may encounter. The platform provides a comprehensive help center with frequently asked questions and troubleshooting guides. Additionally, users can contact customer support via email or live chat, and the platform offers a 30-day refund policy for all courses.
Feedback	The Udemy application design includes feedback mechanisms that allow users to provide feedback on courses and instructors. This helps the platform to continually improve its offerings and enhance the learning experience for its users.

Mobile Optimization	The Udemy application is optimized for use on mobile devices. The platform offers a mobile app for both iOS and Android, allowing users to access courses from their smartphones and tablets. The mobile app provides all of the same features as the web application, including personalized recommendations, and course tracking Customer

Talabat application:
Talabat is a popular online food ordering and delivery application that operates in several countries. The application has a number of quality design principles that contribute to its user interface, user experience, and usability.
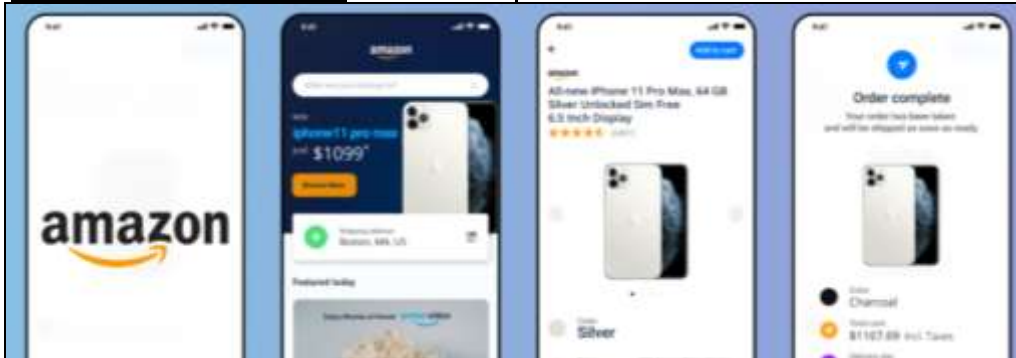

User Interface	The user interface (UI) of the Talabat app is visually appealing and user-friendly. The app has a simple and clean design that is easy to navigate. The interface is designed to be intuitive and self-explanatory, with clear and concise instructions on how to use the app. The app uses a consistent color scheme throughout, with an orange and white color palette that is easy on the eyes. The interface is designed to be responsive, adapting to different screen sizes and orientations.
User Experience	The user experience (UX) of the Talabat app is designed to be seamless and efficient. The app is designed to make the user's experience as smooth as possible, with a focus on speed and convenience. The app has a search bar that allows users to quickly find the restaurants or food they are interested in. The app also offers a variety of filters and sorting options to help users find what they want more easily. The app provides real-time updates on the status of orders, as well as estimated delivery times. The Talabat app provides a personalized experience for users by offering recommendations based on their previous orders and preferences. The app also allows users to save their favorite restaurants and meals, making it easier for them to reorder in the future. The app's personalized features help to make the user experience more enjoyable and efficient.
Usability	The Talabat app is designed to be highly usable, with a focus on ease of use and accessibility. The app has a simple and intuitive interface that is easy to navigate, even for users who are not familiar with it.
Support	The Talabat app provides excellent customer support, with a variety of options for users to get help when they need it. The app has a built-in chat feature that users can use to get immediate assistance from customer support agents. The app also has an extensive help center with articles and FAQs that users can access for self-help. Additionally, the app provides users with the ability to rate and provide feedback on their experience, which can help to improve the app's customer support over time.
Feedback	The app also has a built-in feedback system that allows users to provide feedback on their experience, which can help improve the app's usability over time.
Mobile Optimization	The talabat application is optimized for use on mobile devices. The platform offers a mobile app for both iOS and Android, allowing users to access courses from their smartphones and tablets.

Amazon application

Amazon is a well-known online retail platform that offers a wide range of products to customers around the world. The Amazon application is designed to provide a seamless shopping experience to users on their mobile devices. Here is an analysis of the quality design principles, user interface, user experience, and usability of the Amazon application: Quality Design Principles:

|	
User Interface	The application has a clean and modern visual design, with high-quality product images and well-designed icons and buttons. The layout is intuitive and easy to navigate, allowing users to find what they are looking for quickly. The application maintains consistency throughout, with the same font, color scheme, and design elements used across all pages. This helps users to easily identify the brand and feel comfortable using the platform.
User Experience	The Amazon application offers a convenient shopping experience to users, with one-click ordering, fast shipping, and easy returns. The application is designed to be fast and responsive, with quick loading times and minimal lag. provides users with feedback and notifications throughout the shopping process, from order confirmation to delivery updates and customer service interactions. The Amazon application allows users to customize their experience by saving their preferences and showing them personalized product recommendations based on their search history and previous purchases.
Usability	The Amazon application has a powerful search functionality that allows users to find products quickly and easily. also has a clear and easy-to-use navigation system, with well-organized categories and subcategories. also offers a variety of payment options, including credit cards, PayPal, and Amazon Pay, making it easy for users to complete their purchases. The Amazon application provides detailed information about each product, including product descriptions, specifications, reviews, and ratings. This helps users make informed purchase decisions. also allows users to save products to their wish list, which they can access later to purchase or share with others.
Support	The Amazon's application is designed to provide excellent customer support to users. The application has a dedicated customer support team, and users can contact them through various channels such as phone, email, and chat. This helps to ensure that users can get help with any issues they may encounter while using the application.
Feedback	The application gives users feedback on their actions, such as adding an item to the cart or completing a purchase. It provides users feedback and notifications throughout the shopping process, from order confirmation to delivery updates and customer service interactions.
Mobile Optimization	The Amazon application is optimized for use on mobile devices. The platform offers a mobile app for both iOS and Android, allowing users to access courses from their smartphones and tablets.

6. Search procedures:

The study aimed to evaluate the quality design criteria in mobile apps and its impact on user experience (UX) and usability. The research used a
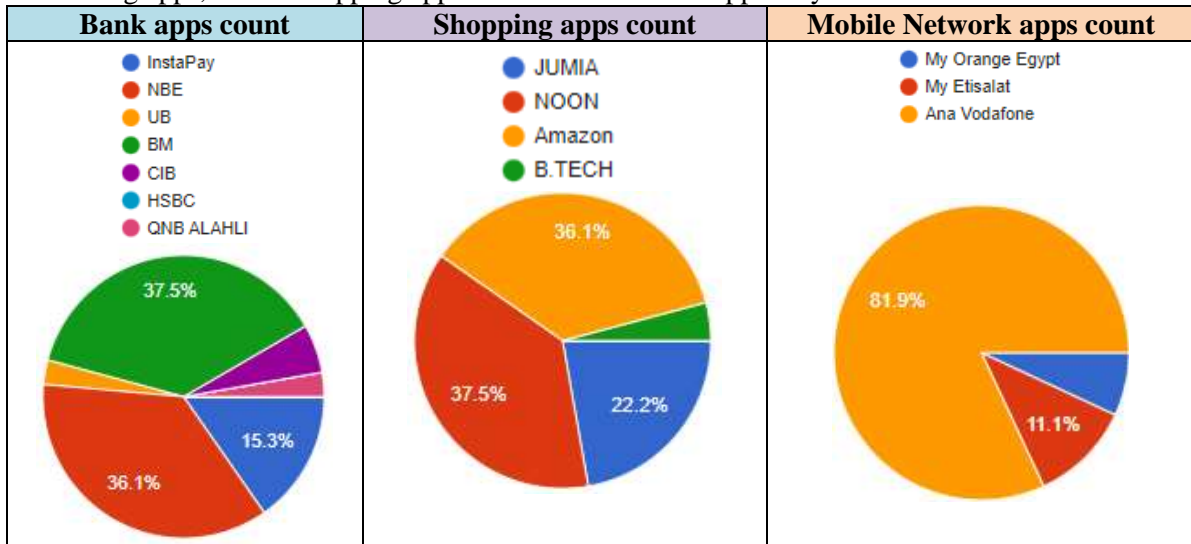
questionnaire-based approach to gather data from a random sample of individuals. The questionnaire was designed to measure the quality design criteria in three categories of mobile apps, bank apps, shopping apps, and mobile network apps. A total of 73 responses were collected from the participants, The research sample, as shown in the following chart:

which provided valuable insights into the quality design criteria of the three categories of mobile apps. The study found that the quality design criteria had a significant impact on the UX and usability of mobile apps across all three categories.

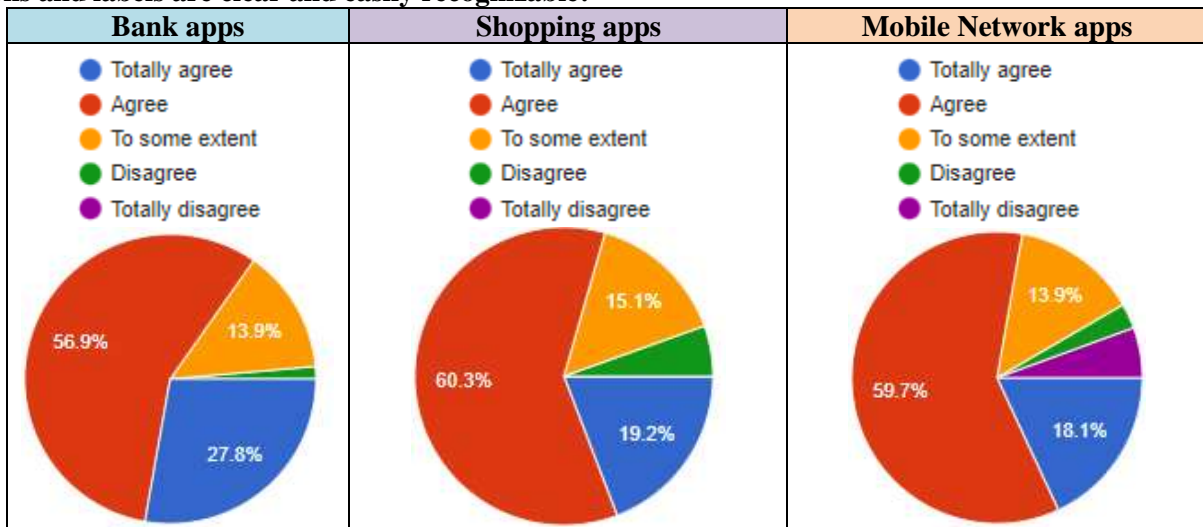| Age	Gender
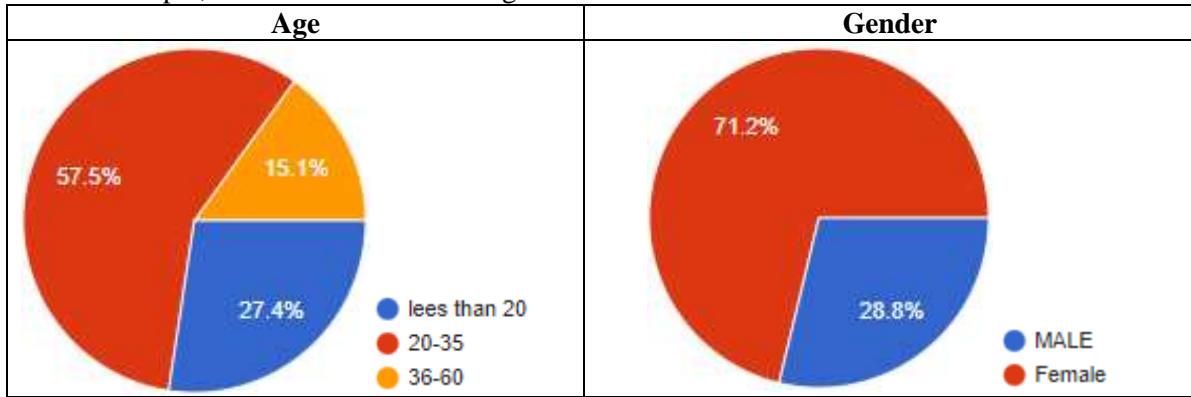
The results of the survey questions are as follows:

Which banking apps, online shopping apps and mobile network apps do you use?

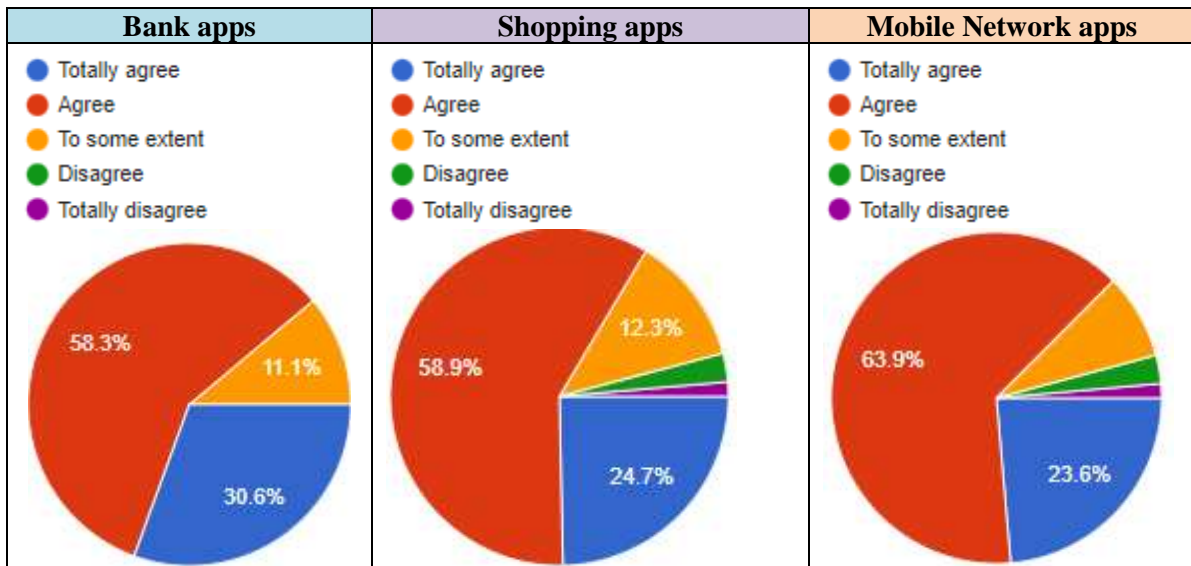| Bank apps count	Shopping apps count	Mobile Network apps count

Icons and labels are clear and easily recognizable:

Bank apps	Shopping apps	Mobile Network apps

The colors used in the app are pleasing to the eye.

Bank apps	Shopping apps	Mobile Network apps
● Totally agree ● Agree ● To some extent ● Disagree ● Totally disagree	● Totally agree ● Agree ● To some extent ● Disagree ● Totally disagree	● Totally agree ● Agree ● To some extent ● Disagree ● Totally disagree
59.7% 29.2%	19.2% 50.7% 23.3%	12.5% 59.7% 22.2%
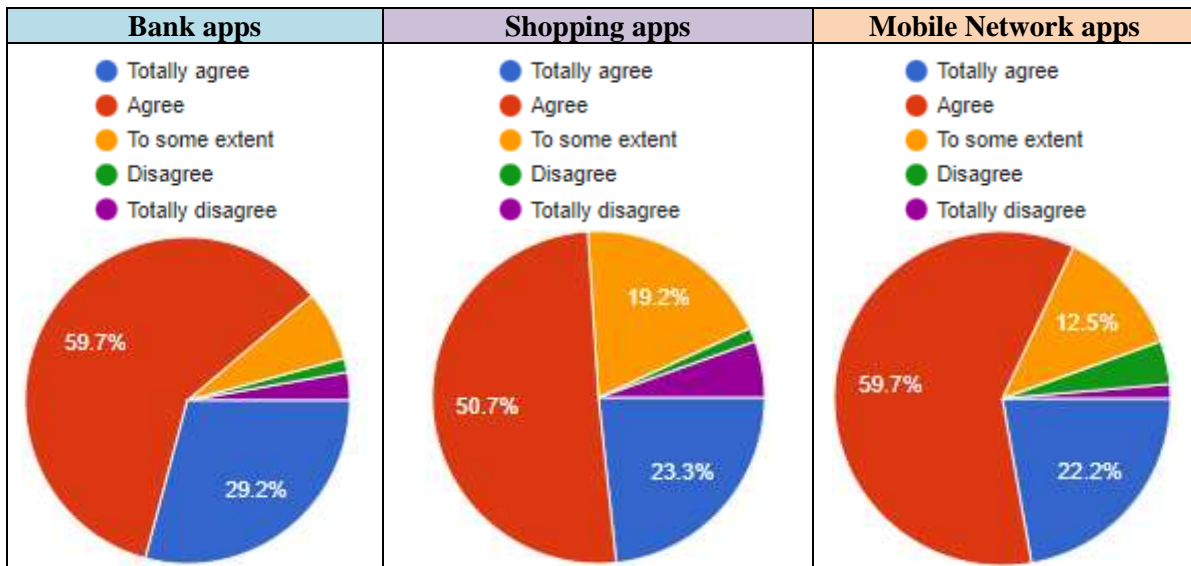
Writing style and font size appropriate for readability.

Bank apps	Shopping apps	Mobile Network apps
● Totally agree ● Agree ● To some extent ● Disagree ● Totally disagree	● Totally agree ● Agree ● To some extent ● Disagree ● Totally disagree	● Totally agree ● Agree ● To some extent ● Disagree ● Totally disagree
58.3% 11.1% 30.6%	58.9% 12.3% 24.7%	63.9% 23.6%

The application responds to different screen sizes and resolutions.

Bank apps	Shopping apps	Mobile Network apps
● Totally agree ● Agree ● To some extent ● Disagree ● Totally disagree	● Totally agree ● Agree ● To some extent ● Disagree ● Totally disagree	● Totally agree ● Agree ● To some extent ● Disagree ● Totally disagree
20.8% 56.9% 20.8%	15.1% 54.8% 26%	16.7% 55.6% 26.4%
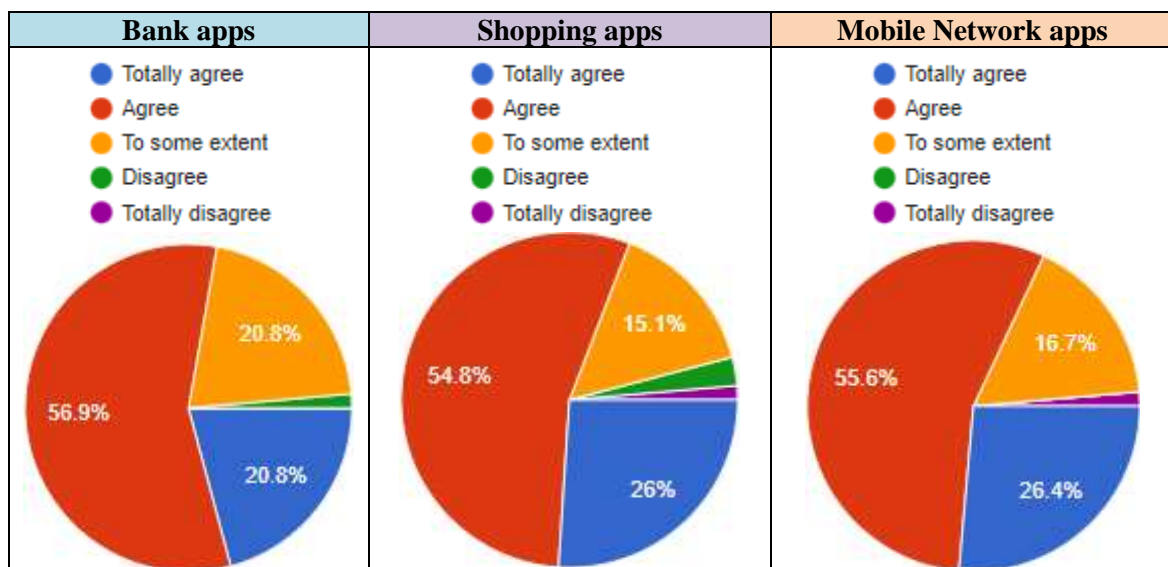
Movements and transitions are smooth and consistent

Bank apps	Shopping apps	Mobile Network apps

- Totally agree
- Agree
- To some extent
- Disagree
- Totally disagree

Bank apps: 20.8% (To some extent), 54.2% (Agree), 20.8% (Totally agree)

Shopping apps: 16.4% (To some extent), 54.8% (Agree), 24.7% (Totally agree)

Mobile Network apps: 9.7% (To some extent), 59.7% (Agree), 23.6% (Totally agree)
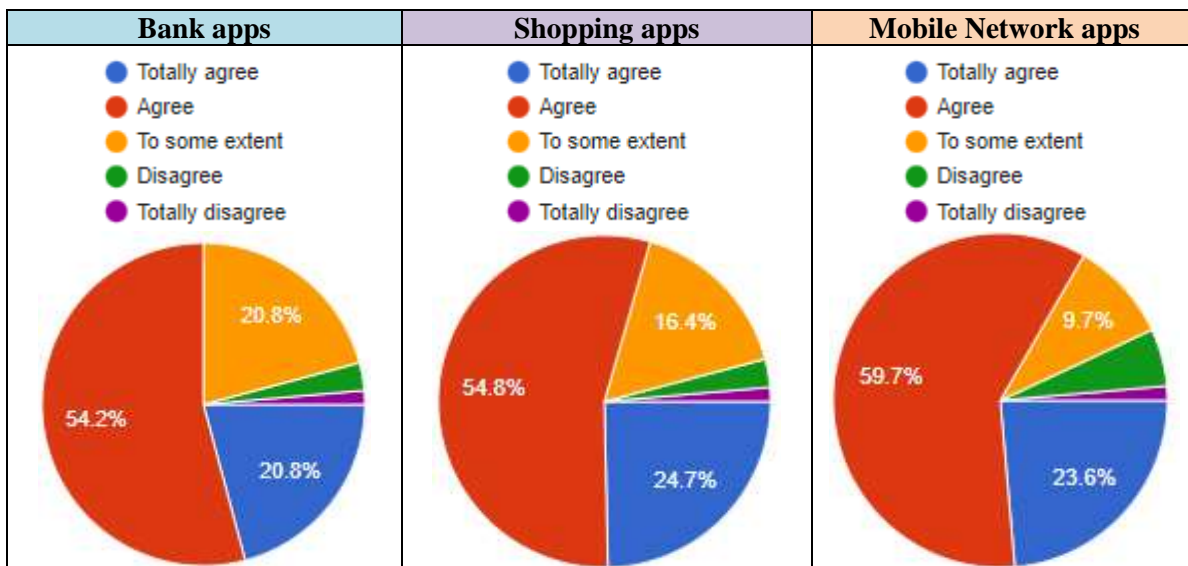
The design and layout of the application conveys its intended message and purpose

Bank apps	Shopping apps	Mobile Network apps

- Totally agree
- Agree
- To some extent
- Disagree
- Totally disagree

Bank apps: 15.3% (To some extent), 59.7% (Agree), 20.8% (Totally agree)

Shopping apps: 11% (To some extent), 58.9% (Agree), 26% (Totally agree)

Mobile Network apps: 9.7% (To some extent), 63.9% (Agree), 19.4% (Totally agree)
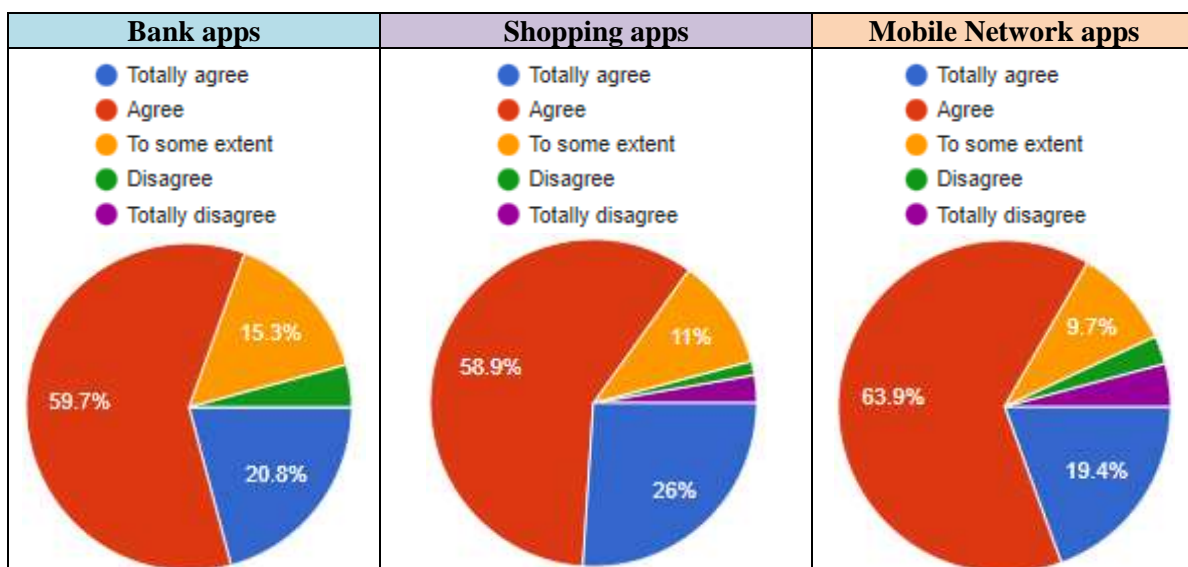
The application provides clear feedback to users while performing actions or transitions

Bank apps	Shopping apps	Mobile Network apps

- Totally agree
- Agree
- To some extent
- Disagree
- Totally disagree

Bank apps: 16.7% (To some extent), 56.9% (Agree), 22.2% (Totally agree)

Shopping apps: 16.4% (To some extent), 60.3% (Agree), 19.2% (Totally agree)

Mobile Network apps: 16.7% (To some extent), 59.7% (Agree), 20.8% (Totally agree)
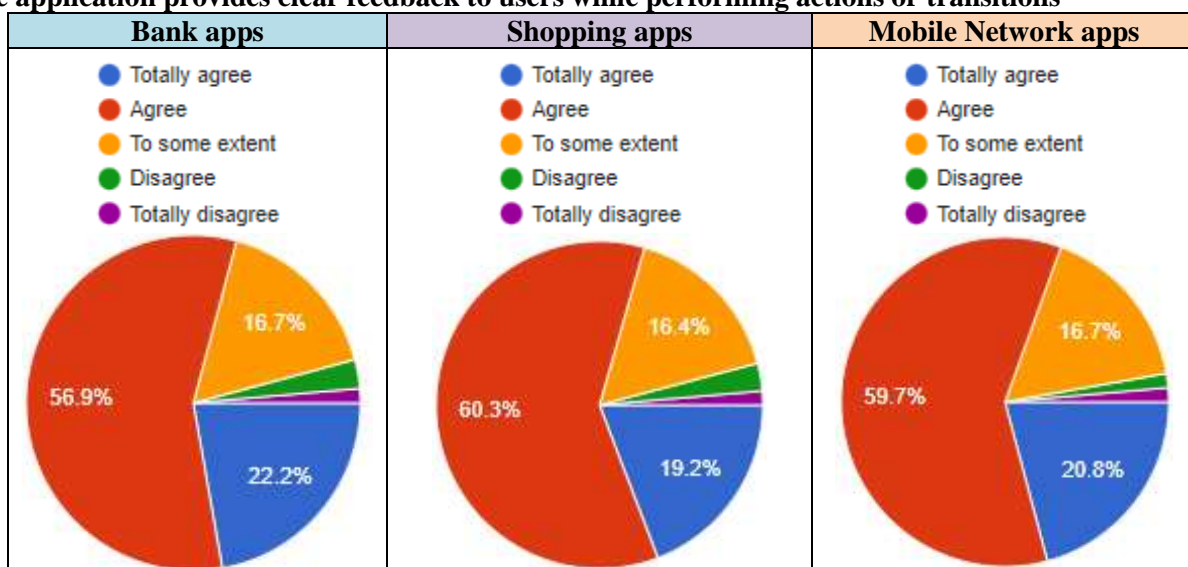
The design of the app provides customization options suitable for the users

Bank apps	Shopping apps	Mobile Network apps
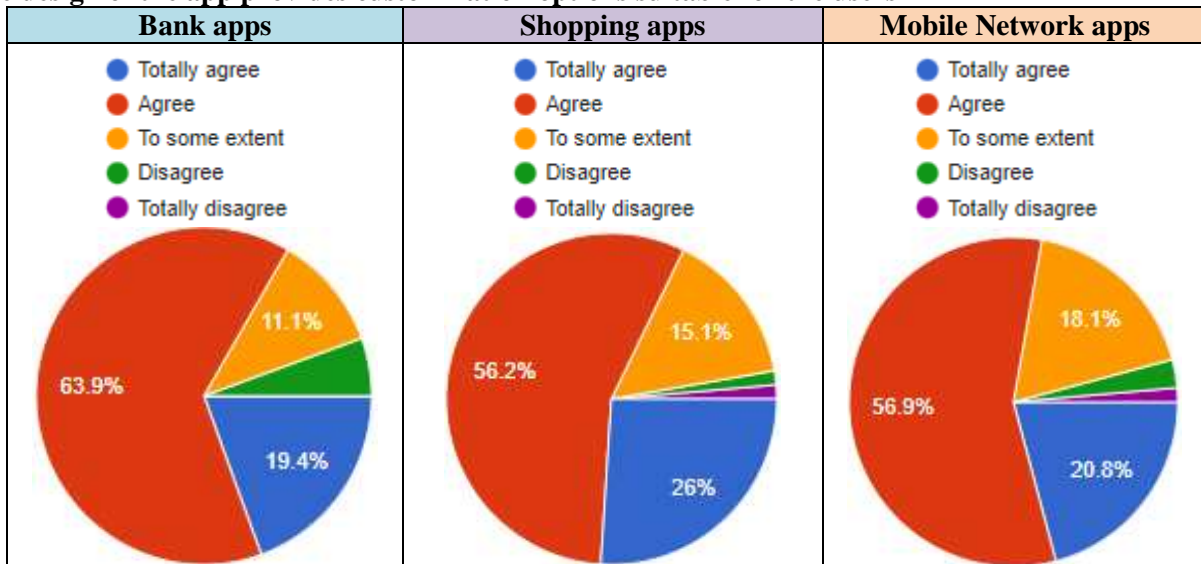
The design of the user interface provides an overall pleasant and satisfying experience

Bank apps	Shopping apps	Mobile Network apps
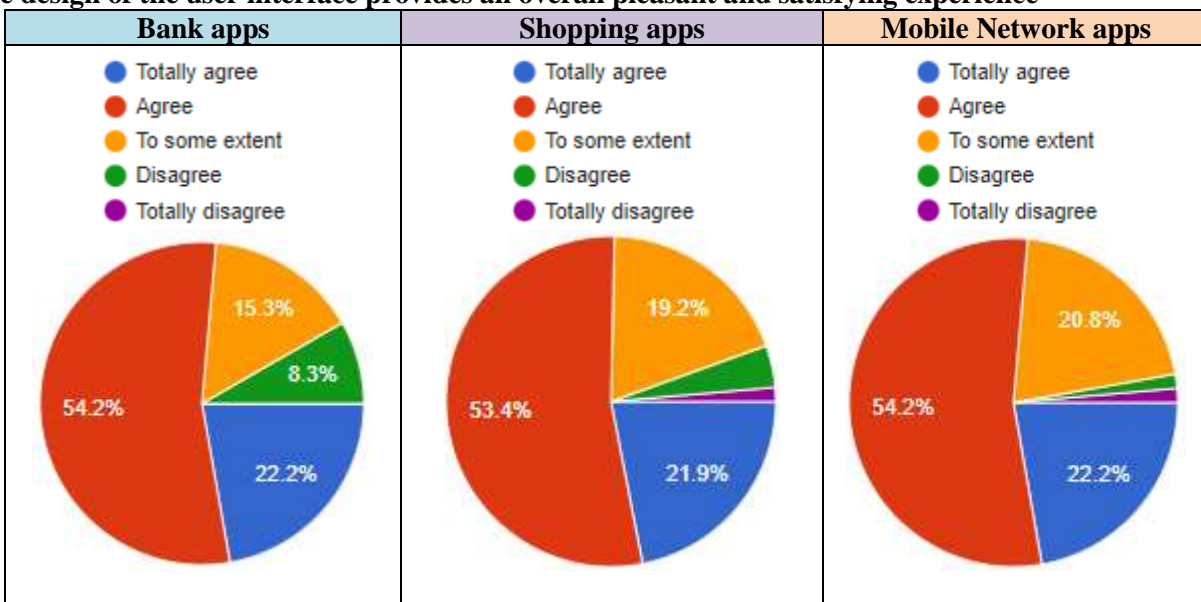
Results and discussion

Based on the questionnaire responses, the following quality design criteria for three categories apps can be identified:

* Visual appealing

For bank apps, 66.7% of respondents agreed that visual appeal is an important quality design criterion, while 33.3% responded that it is to some extent important.

For shopping apps, 84.9% of respondents agreed that visual appeal is an important quality design criterion, while 9.6% responded that it is to some extent important.

For mobile network apps, 82% of respondents agreed that visual appeal is an important quality design criterion, while 13.9% responded that it is to some extent important .

Overall, the majority of respondents for all three categories of apps agreed that visual appeal is an important quality design criterion, indicating that developers should prioritize the visual appeal of their apps.

Visual appeal is an essential aspect of app design, as it can impact the first impression that users have of the app. A visually appealing app can engage users and create a positive user experience, while an unappealing design can lead to users quickly losing interest or becoming frustrated. Therefore, it is important for app designers to carefully consider the visual design of their app and ensure that it is well-received by their target audience.

* Clear icons

For bank apps, 84.7% of respondents agreed that clear icons are an important quality design criterion, while 13.9% responded that it is to some extent important.

For shopping apps, 79.5% of respondents agreed that clear icons are an important quality design criterion, while 15.1% responded that it is to some extent important.

For mobile network apps, 77.8% of respondents agreed that clear icons are an important quality

design criterion, while 13.9% responded that it is to some extent important.

These results suggest that clear icons are also an important quality design criterion for all three categories of apps. Developers should ensure that their app icons are easy to recognize and understand, as this can enhance the overall user experience and make navigation within the app more intuitive.

Clear icons are important for app usability, as they can help users understand the app's functionality and navigate it more easily. Ambiguous icons, on the other hand, can lead to confusion and frustration among users. Therefore, it is crucial for app designers to ensure that the icons used in their app are clear and easy to understand for their target audience**.**

Pleasing Color

For bank apps, 88.9% of respondents agreed that pleasing colors are an important quality design criterion.

For shopping apps, 74% of respondents agreed that pleasing colors are an important quality design criterion, while 19.2% responded that it is to some extent important.

For mobile network apps, 81.9% of respondents agreed that pleasing colors are an important quality design criterion, while 12.5% responded that it is to some extent important.

These results indicate that pleasing colors are also an important quality design criterion for all three categories of apps. Developers should consider using a color scheme that is visually appealing and consistent with the app's branding to enhance the overall user experience.

Smooth and consistent navigation

For bank apps, 75% of respondents agreed that smooth and consistent navigation is an important quality design criterion, while 20.8% responded that it is to some extent important.

For shopping apps, 79.5% of respondents agreed that smooth and consistent navigation is an important quality design criterion, while 16.4% responded that it is to some extent important.

For mobile network apps, 83.3% of respondents agreed that smooth and consistent navigation is an important quality design criterion, while 9.7% responded that it is to some extent important.

These results indicate that smooth and consistent navigation is an important quality design criterion for all three categories of apps. Developers should ensure that their apps provide an intuitive and easy-to-use navigation system, with clear labels and logical grouping of features.

* Clear feedback

In terms of clear feedback, a majority of users agree that it is important **for bank apps** (79.1%),

shopping apps (79.5%), and **mobile network apps** (80.5%). However, there is also a smaller percentage of users who only agree to some extent, with 16.7% for bank apps, 16.4% for shopping apps, and 16.7% for mobile network apps. Clear feedback can help users understand their actions and provide guidance on how to proceed within the app.

* Customization

Based on the collected data, a majority of users agree that customization is important for **bank apps** (83.3%), **shopping apps** (82.2%), and **mobile network apps** (77.7%). However, there is a smaller percentage of users who only agree to some extent, with 11.1% for bank apps, 15.1% for shopping apps, and 18.1% for mobile network apps. This suggests that allowing users to customize certain aspects of the app, such as the interface or settings, can improve their overall experience**.**

* Responsive design

For bank apps, 77.7% of respondents agreed that responsive design is an important quality design criterion, while 20.8% responded that it is to some extent important.

For shopping apps, 80.8% of respondents agreed that responsive design is an important quality design criterion, while 15.1% responded that it is to some extent important.

For mobile network apps, 82% of respondents agreed that responsive design is an important quality design criterion, while 16.7% responded that it is to some extent important.

These findings suggest that responsive design is an important quality design criterion for all three categories of apps. Developers should ensure that their apps are optimized for different screen sizes and orientations, and that they provide a consistent user experience across different devices.

Overall, these varying levels of agreement demonstrate the importance of responsive design in mobile app development, and how it can impact user experience and satisfaction.

Design app suitable message and purpose

Based on the collected data, a majority of users agree that the design and layout of bank apps (80.5%), shopping apps (84.9%), and mobile network apps (83.3%) effectively convey their message and purpose. A smaller percentage of users indicated that they only agreed to some extent, with 15.3% for bank apps, 11% for shopping apps, and 9.7% for mobile network apps. Overall, it can be inferred that a well-designed and purposeful layout is crucial for users to easily navigate and understand the features of these types of apps.

* Pleasant and satisfying user experience:

Based on the collected data, a majority of users

agree that having a pleasant and satisfying experience is important for **bank apps** (76.4%), **shopping apps** (75.3%), and **mobile network apps** (76.4%). However, there is also a smaller percentage of users who only agree to some extent, with 15.3% for bank apps, 19.2% for shopping apps, and 20.8% for mobile network apps. A pleasant and satisfying experience can lead to increased user engagement, loyalty, and positive reviews. It can also improve the overall perception of the app and the brand it represents.

These responses suggest that providing a pleasant and satisfying user experience is important for mobile apps, and developers should prioritize this aspect of their design. Users are more likely to continue using and recommending an app that provides a satisfying experience, making it more likely to achieve success and positive reviews.

Conclusion:

In conclusion, designing a high-quality mobile app requires a user-centered approach, with a focus on navigation, usability, visual design, performance, and Responsiveness. By prioritizing these design criteria, app developers can create an app that meets the needs and expectations of their users, resulting in a positive user experience and increased user engagement.

1- The design of the app should be centered around the needs and preferences of the users. This involves understanding the target audience, conducting user research, and creating user personas to guide the design decisions.

2- The app should have an intuitive and easy-to-use interface, with clear navigation and well-organized content. Users should be able to find what they are looking for quickly and easily.

3- The app should have an attractive and consistent visual design that reflects the brand identity and creates a positive user experience. This includes the use of appropriate color schemes, typography, and imagery.

4- The app should be fast and responsive, with quick load times and smooth transitions between screens. Users should not experience any lag or delays when using the app.

5- The app should be designed to work seamlessly across a range of devices and platforms, including smartphones and tablets with different screen sizes and resolutions, as well as different operating systems.

6- The app should have customization options. Users should be able to customize the interface to suit their preferences and needs. This may involve allowing users to change the layout, color scheme, or font style of the interface. By providing customization options, users can personalize their experience and feel more connected to the device.

7- Clear font style is also an important design quality criterion for smartphone interfaces. The font should be easy to read, with a clear and consistent style throughout the interface. This is particularly important for users with visual impairments or reading difficulties. By using a clear font style, designers can improve the usability and accessibility of the interface.

8- Pleasing colors can also have a significant impact on user experience. The color scheme of the interface should be pleasing to the eye and not too distracting or overwhelming. The use of color can be used to differentiate between different functions and elements within the interface, making it easier for users to navigate and understand.

9- clear feedback is important aspect of design quality criteria for smartphone interfaces. Users should receive clear and concise feedback when interacting with the interface. This may involve providing visual and auditory cues, such as animations or sounds, to indicate when an action has been completed or when an error has occurred. Clear feedback can help users understand how to use the interface and improve their overall experience.

10- In addition, designers should also consider the context in which the smartphone interface will be used. For example, if the device will be used primarily in outdoor environments, the interface should be designed to be visible in bright sunlight. If the device will be used by people with different hand sizes or disabilities, the interface should be designed to be easily accessible and usable by a wide range of users.

11- Finally, designers should also consider the performance of the smartphone interface. The interface should be designed to run smoothly and quickly, with minimal lag time or delays. This is particularly important for users who rely on their devices for work or other important tasks. By optimizing the performance of the interface, designers can improve the usability and overall user experience of the device.

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